



Aeromycological Survey of Vegetable and Fruit Market of Udgir, Latur, Maharashtra, India

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ABSTRACT

Aerosols consists of fungal spores, pollen grains, bacteria, viruses, insects, protozoa, hypal fragments and many other unidentified particles were found in this market area. In vegetable and fruits market environment aeromycoflora contains mostly fungal spores which cause the diseases to fruit and vegetable and the various allergies to human beings. Aeromycological Survey was carried out in the vegetable market of Udgir region using Rotorod air sampler for the period of one year. Total 20 fungal forms were recorded during the study period. *Aspergillus* (10.719), *Rhizopus* (9.820), *Exosporium* (6.500) and *Sporidesmium* (5.394) were recorded as the predominant forms whereas *Alternaria*, *Penicillium*, *heterosporium* etc. were found with comparatively low concentration. It was observed the concentration of the spores in the air differ from season to season probably due to variation in meteorological parameters. The most common fungi identified were species of *Fusarium*, *Curvularia*, *Aspergillus*, *Penicillium*, and *Exosporium*. The composition and concentration of fungal spores considerably varied from season to season probably due to variation in meteorological parameters. During winter season it shows higher number of fungal colonies than rainy season and less number of fungal colonies is recorded in summer season.

Keywords: Aeromycoflora, vegetable and fruit market, Rotorod air sampler, parameters, fungal spores.

INTRODUCTION

Vegetables and fruits are included in daily diet. viz. tomato, potato, spinach, cauliflower, reddish, bitter guard, cabbage etc and banana, guava, apple, grape, orange, mango, pomegranate and coconut. Fruits and vegetables are important food and highly nutritious which are used to build up and repair the body. The yield of vegetables and fruits reduces gradually due to the soil borne fungi. In various market places spoiled material due to constant builds up of spore population from fungi growing on them and other aerosols are present in that

environment. The fungal spores remain suspended for longer time in the air, their presence depend on the various factors like humidity, temperature, sunlight, seasonal climatic variations. Suspension of organic and inorganic material also effects the distribution of microbes in the air. Numbers of microscopic fungal spores are occurred in environment are commonly called as fungal bioaerosols. (Singh and Dahiya, 2008). The presence of fungal spores, volatiles and mycotoxins in the air can cause health hazards in all segments of the population. (Kakde et al. 2001).

Numbers of investigation on the aeromycoflora have been done in order to correlate with different types of diseases and allergic disorders in humans. The different kinds of diseases in vegetable markets in India, (Kakde, 2012), (Medhi, 2010), (Sharma, 2001), (Tiwari ,1999). Many allergic human diseases like asthma, rhinitis and cardio- respiratory diseases are attributed due to inhalation of airborne fungal spores and pollen grains. (Shivpuri and Singh, 1971), (Chanda and Mandal, 1978). Aerobiological studies enable us to ascertain the concentration of fungal spores in the air and such studies have been developed in different parts of the world. (Tiwari and Jadhav, 2004), (Kakde et al. 2001), (Das and Bhattacharya, 2008).

MATERIAL AND METHODS

The aeromycological survey was carried out in the outdoor environment of vegetables and fruits market (Udgir vegetable and fruit market), district Latur Maharashtra, India from January 2023 to December 2023. In this investigation aeromycoflora was recorded at different places of vegetables and fruits market at Udgir. The observations were taken in one week of every month for the presence of spores in the market air. The monitoring of atmospheric fungal spores was carried out for one year from January 2023- December 2023. The fungal spores were captured by using Rotorod air sampler (Perkin, 1957). The sampler was operated in morning for 15 to 20 minutes twice in a week. The sampler was installed at height of 2 meters from the ground level.

After sampling the air, the cello tape was mounted on a 24 × 60 mm glass slide and mounted with glycerine jelly. The strips were then scanned under binoculars microscope indentation of the spore was done on the basis of morphological characters and with the help of available literature, (Tilak and Srinivasulu, 1967).

RESULT AND DISCUSSION

The present work was aimed at determining the fungal flora, their identification, concentration and diversity on the vegetable and fruit market of Udgir, Maharashtra, India. Altogether 20 types of fungal spore types were recorded, of which deuteromycotina shows the highest (52.63 %) concentration followed by zygomycotina (14.31 %) and basidiomycotina (8.15 %) whereas other type shows (6.49 %) concentration. Major spore types and % contribution is given in table 1. An average 7230 spores / m³ in air was recorded. The major fungal types encountered during study were *Aspergillus* (10 %), *Rhizopus* (9.8 %), *Exosporium* (6.5 %), *Sporidesmium* (5.3%) and *Alternaria* (4.9%). The percentages of spores are listed in table 1. *Rhizopus* is the only member from group zygomycotina was reported during the investigation with (9.820%) contribution. Whereas smut spores (2.42%), rust spores (2.90%) and Basidiospores (2.42%) were the major contributors from class Basidiomycotina. Other type formed (6.50%) part of the total airspora. It comprises of hyphal fragments (3.66%), epidermal hair (0.42%) and insect part (2.42%). A major fraction of unidentified type was also reported with (13.13%) contribution may be due to lifting of ground dust during morning hours. Frequency of fungal spore population is closely associated with season variation and climatic conditions. Peak concentration was recorded in October and November 2023; Second peak was noticed in the month August and September 2023. It was found that moderate temperature, high relative humidity and mild rains favoured, fungal growth. The minimum concentration was recorded in the month of March it was due to the absence of rain and high humidity. The observation suggests the fact that, higher temperature does not favour fungal growth in the atmosphere. During the period of heavy rains decrease in spore load was recorded. The observation was in conformity with the observation made Tilak, 1989. The Basidiomycotina contributed (8.15%) to the total airspora. The spore population comprised of rust spores, smut spores and Basidiospore. The frequency of rust and smut spores was recorded higher in the November. This may be due to high humidity, which is favourable for release of spores. From group Deuteromycotina, 15 spore types were recorded. Out of which *Aspergillus* (10.71%), *Exosporium* (6.50%), *Sporidesmium* (6.72%), *Alternaria* (4.91%), *Penicillium* (4.84%) were the major contributors (Rajan, 1952).

Table- 1 Concentration of airborne components in vegetable and fruit market Gondpuri from January - 2023 to December - 2023.

Sr. No.	Spore Type	Spore/ cubic meter of air	% of individual aerospora
A. Zygomycotina			
1.	<i>Rhizopus</i>	710	9.820
2.	<i>Albugo</i>	325	4.495
B. Basidiomycotina			
3.	Rust spores	210	2.904
4.	Basidiospores	175	2.420
5.	Smut spores	205	2.835
C. Deuteromycotina			
6.	<i>Aspergillus</i>	775	10.719
7.	<i>Penicillium</i>	350	4.840
8.	<i>Alternaria</i>	355	4.910
9.	<i>Curvularia</i>	320	4.426
10.	<i>Fusarium</i>	70	0.968
11.	<i>Cladosporium</i>	190	1.798
12.	<i>Bispora</i>	270	3.734
13.	<i>Fusariella</i>	210	2.904
14.	<i>Exosporium</i>	470	6.500
15.	<i>Heterosporium</i>	230	3.181
16.	<i>Sporidesmium</i>	390	5.394
17.	<i>Nigrospora</i>	30	0.414
18.	<i>Pithomyces</i>	200	2.766
19.	<i>Memnoniella</i>	150	2.074
20.	<i>Helmenthosporium</i>	175	2.420
D. Other type			
21.	Hyphal fragments	265	3.665
22.	Insect part	175	2.420
23.	Epidermal hair	30	0.414
E. Unidentified group			
	Total	7230	100

Table -2: Total no. of spores found in each group

Sr. no.	Spore type	Total no. Of spore type	Spores/m ³	% contribution
1.	Zygomycotina	02	1035	14.315
2.	Basidiomycotina	03	590	8.160
3.	Deuteromycotina	15	4185	57.883
4.	Other types	03	470	6.500
5.	Unidentified	01	950	13.139
	Total	24	7230	100

These spores were frequently observed during the investigation period, as they are dry and can be easily blown away by wind while *Fusarium* is retained in a sticky liquid and is release by water or strong winds. (Ingold, 1953).

CONCLUSION

The present study clearly shows that there is a need to study the aeromycoflora of vegetable and fruit

markets, local storage places, to find out and develop data base of fungal types which can be present in that particular area. Monitoring of fungal spores from indoor and outdoor environments of vegetable and fruit markets of Udgir city, Maharashtra help in post-harvest disease management in it. To find out the status of various types of allergic and pathogenic spores at different places of Udgir city is important because it causing health hazards to human beings and spoilage of vegetables and fruits in the different

markets. The present study strongly supports that the toxigenic fungal pathogens isolated in different fruit and vegetable markets of Udgir city, Maharashtra, India causing air pollution and damaging the health of fruit and vegetable vendors.

Conflict of interest: The authors declare that they have no conflict of interest.

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